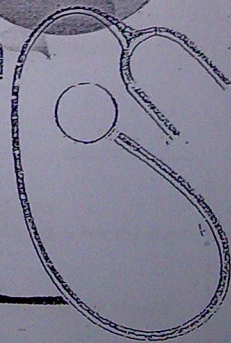


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Special Thanks to
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GENERAL EXAMINATION

1. Intellectual functions
2. Body Build
3. Facies
4. Decubitus

5. Vital signs
6. Head
7. Neck
8. Upper Limb
9. Lower Limb



1. Intellectual Functions: The patient is:

Fully conscious – Alert – Cooperative - Well oriented to time, place and person -
Of Average mood – Intelligent - With an intact memory to recent and remote events

N.B.

- In deep coma, the patient doesn't respond to any stimuli
- In coma, the patient can respond to painful stimuli.
- Memory abnormalities (e.g. amnesia) that can occur are of 2 types:
 1. Retrograde: (forgets old events) as in infarction or damage to the brain.
 2. Anterograde: (forgets recent events) as in atherosclerosis.

2. Body Build:

The patient is of average body build.

Examine the following:

- a. Weight of the patient
- b. Height
- c. Length
- d. Upper and lower body segments
- e. Span
- f. Thickness of the skin
- g. Skull (المحيط) → circumference in children

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N.B.

- In disproportionate dwarfism, the height is bigger than the span.
- The span is the distance between the tips of the 2 middle fingers, when the arms are abducted beside the body at 90 degrees.
- In myxedema, the thickness of the skin is increased.
- In an infant with hydrocephalus & microcephalus (craniosynostosis), we should examine the circumference of the skull
- Normally upper body segment = lower body segment.
- Normally body height = span.

3. Facies (the general look of the face):

The face can appear:

- Earthy look in renal failure.
- Plethoric (congested face) in lung diseases (COLD)
- Acromegaly
- Cushinoid face.
- Toxic face.

If there are no abnormalities, the patient will show no specific facies.

4. Decubitus: (refers to the position of the patient in bed).

✓ Normally the patient is lying down on his bed comfortably.

- * An abnormal position could be seen in orthopnoea (difficulty of breathing on lying down), where the patient lies, with many pillows under his head.
- * Patient may lie on one side in lung abscess.
- * Patient may be sitting and bending forwards in pericardial effusion
- * Patient may be squatting

5. Vital Signs: The four basic vital signs are temperature, pulse, BP and respiration.



I TEMPERATURE



A thermometer is used to measure the temperature, being placed for 2-3 minutes.

* The normal body temperature is 36.5-37.3

* This temperature is specific to the body and remains fixed for life i.e. if a person has a normal body temperature of 37°C, then his normal temperature is 37°C throughout his life.

** The ways of measuring the body temperature, using a thermometer placed for 2-3 minutes, include:

i) Sublingual method

* The most common and most accurate method, However it is contraindicated in:

- Young children
- Comatose patients, patients with epilepsy or with mouth breathers (heart failure)
- Infections transmitted by saliva, or painful conditions of the mouth

II) Axillary method

After reading the temperature using this method, add another 0.5°C to obtain the real temperature, if the sublingual method cannot be used.

This method is contraindicated in autonomic neuropathy, as in diabetics.

III) Rectal method

Subtract 0.5°C from the temperature you read by this method to get the real temperature.

Contraindications are:

- > Imperforated anus or bleeding per rectum.
- > Painful condition of the rectum, or cancer rectum.

II PULSE

It is the "throbbing" of peripheral arteries as an effect of the heartbeat, and is used in most people as an accurate measure of heart rate.

Examine the pulse in the radial artery (the lateral artery!), by placing your 3 middle fingers in a position where they are directed to the thumb of the patient.

Comment on the pulse includes:

1. Rate:

Measure it in one complete minute, as an extra systole can occur just once in the minute.

*Normal range: 60-100 beats per minute

- If less than that: Bradycardia
- If more than that: Tachycardia

2. Rhythm:

(1) Regular

Tachycardia i.e. $>100/\text{min}$

Bradycardia i.e. $<60/\text{min}$

(2) Irregular

Atrial Fibrillation	Extrasystole
You cannot count 4 regular consecutive beats.	You can count 4 regular consecutive beats.
Pulsus deficit $>10/\text{min}$.	Pulsus deficit $<10/\text{min}$.
Absence of A wave in neck veins.	-----
Gets worse by exercise.	Improves by exercise.
Intensity of S1 is variable.	-----

- ☒ *Pulsus deficit* is the difference between the radial beat/minute, and the apical beat/minute where apical beats count more.

3. Volume:

- By clinical sense and through training, you should know how to identify a normal beat volume. (abnormalities include big volume and weak pulse).

4. Character:

- Place your fingers so as to feel the radial pulse.
- Normally, there are no special characters in the radial pulse.
- Abnormally, you can spot the following pulse changes:

♦ *Pulsus Bigeminus*:

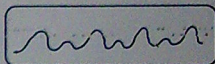
The ectopic beats (extrasystole) following the normal beats, so one normal beat followed by stronger extrasystole.

تضع أصابعك و تحس ضربة عادية ثم ضربة أقوى و هكذا دون تغيير

♦ *Pulsus Alternans*

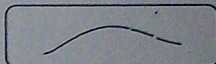
A normal beat followed by a weak beat example in case of severe heart failure.

تضع أصابعك و تحس ضربة عادية ثم ضربة ضعيفة و هكذا



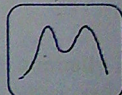
♦ *Pulsus Parvus et tardus*: occurs in aortic stenosis.

تضع أصابعك و تحس ضربة بزمان أطول و لكنها بقوة أقل



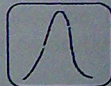
♦ *Pulsus Bisferiens*: occurs in double aortic i.e. stenosis with dilatation

تضع أصابعك و تحس الضربة تزداد في أولها ثم تقل قليلا ثم تزداد في آخرها، ثم تنتهي



♦ *Big pulse volume*: occurs in anemia

تحس بالنقبضة أقوى من العادي الذي تعودت عليه سابقا



♦ *Water hammer or collapsing pulse*: occurs in aortic regurge, severe anemia and Paget's disease. It is characterized by a gradual rise followed by a rapid collapsing fall.

♦ *Pulsus Paradoxus* (It is a pulse that is weak, or that even disappears on inspiration). It occurs in constrictive pericarditis.

Deep
inspiration

Blood goes more to
lungs, and so VR to
the heart decreases

Systolic pr. norm.
decreases by < 10
mmHg

If the decrease of the
systolic p. is > 10 mmHg,
this indicates pulsus
paradoxus

5. Equality:

You should examine the two sides to confirm equality.

Inequality in pulses exists in cases of tumors of the apex of the lung (Pancoast tumor) or cervical rib.

6. Peripheral pulsation:

In lower limb:

- We should examine the dorsalis pedis artery in the foot. It is normally intact, but is normally absent in 15% of people. The dorsalis pedis artery pulse can be palpated readily lateral to the extensor hallucis longus tendon on the dorsal surface of the foot, distal to the dorsal most prominence of the navicular bone.
- If not felt → palpate popliteal artery
- If not felt → palpate femoral artery
- If not felt → palpate renal artery
- If not felt → palpate aorta

In upper limb:

- Palpate radial artery.
- If not felt → palpate brachial artery
- If not felt → palpate axillary artery
- If not felt → palpate carotid artery

7. Arterial wall:

The arterial wall is not felt normally. To examine the arterial wall, use 3 fingers of the same hand. Use the peripheral two fingers to fix the artery concerned (radial artery), and the central finger to sense the artery itself. The arteries are not felt except in cases of atherosclerosis or arteritis.

III BLOOD PRESSURE



There are 2 methods for measuring the blood pressure:

(a) The palpatory method.

(b) The auscultatory method using a sphygmomanometer (from Greek sphygmus, meaning pulse), a device introduced by Scipione Riva Rocci, an Italian physician, in 1896 sounds heard are called Korotcov's sounds.

The two methods are used together, and none can be used instead of the other. The reason for that is the presence of the auscultatory gap.

Palpatory estimation of
systolic pressure

1. Palpate radial artery pulsation by your fingers.
2. Inflate cuff with air until pulsation vanishes.
3. Deflate cuff slowly until you feel the first pulsation, and take the first reading ($\approx$ systolic pressure)
4. Estimate systolic pressure.

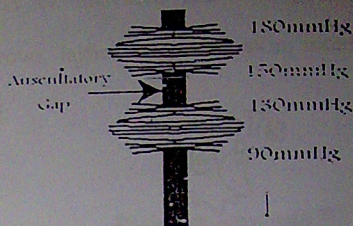
Auscultatory estimation of
systolic and diastolic



5. The lower border of the rubber of the cuff should be above the cubital fossa by 3 cm. Place the stethoscope gently over the point of maximal pulsation of brachial artery.
6. Inflate the cuff to 30 mm Hg above the estimated systolic Pr. by palpatory method.
7. Reduce the pressure at a slow rate of 2-3 mm Hg per second or per pulse beat.
8. Take reading of systolic pressure when repetitive, clear tapping sounds start to appear.
9. Take reading of diastolic pressure when repetitive sounds disappear.

Auscultatory gap:

This occurs in atherosclerosis with old age, where the real systolic pressure of the patient is for example 180 mmHg, and there is a gap with no sounds between 150 mmHg and 130 mmHg. When you use the auscultatory method only, you may raise the pressure to fall in the gap between 130 mmHg and 150 mmHg, so you will not detect the real systolic blood pressure. If you had used the palpatory methodst, you would have continued inflating the cuff above 180 mmHg



- Systolic hypertension occurs when the systolic pressure is above 140 mmHg, and the diastolic pressure is normal. Beta Blockers are the best choice for systemic hypertension.
- Hypertension is diagnosed if diastolic BP is ≥ 90 mmHg
 - (i) 90-95 mmHg is mild.
 - (ii) 96-105 mmHg is moderate.
 - (iii) >105 mmHg is severe.

N.B.

- In aortic regurge, the BP in the lower limb is higher than the upper limb by > 10 mmHg.
- In coarctation of the aorta, Pressure in UL $>$ LL.
- Pressure in one UL may be $>$ than the other UL by > 10 mmHg in case of Cervical rib.

IV RESPIRATION

(Discussed later in chest examination)

6. Head:

You should 1st examine the hair and identify the hairline, whose pattern in males is under the effect of androgens. Inspect for baldness or increased hair falling or other abnormalities.

Then examine everything in the face e.g. eye brows, lashes, eye, nose, skin, mouth and comment on any abnormality.

• In the mouth you should examine the following:

- (1) Lips
- (2) teeth: for dental caries or extracted teeth
- (3) Gums, palate and tonsils.
- (4) Tongue



Colors: Examine the color, for the following findings:

- (a) *Pallor* (شاحب اللون): It is seen in the lips, palm of the hand & nail bed (white nails), & sole of feet. If the patient is Negro, pallor can be seen in the creases of the palm.
- (b) *Jaundice* (الصفراء): It is seen in the sclera of the eye by daylight, in addition to the mucous membranes of the mouth and soft palate.
- (c) *Cyanosis* (bluish): It is seen according to the type of cyanosis, whether central or peripheral.

Central cyanosis:	Peripheral cyanosis:
<i>Etiology:</i> Increased reduced Hemoglobin > 5gm% in the aorta.	<i>Etiology:</i> Stagnation of blood in the peripheral circulation, causing extraction of more O₂.
<i>Signs:</i> * Cyanosis is in the back of the tongue & peripheral parts of the body. * Hands are warm, * Warming the hands has No effect on cyanosis * Clubbing is present.	<i>Signs:</i> * Cyanosis is seen in the peripheral parts of the body only * Hands are cold, * Warming the hands make cyanosis disappear. * Clubbing is never present.

1. The neck veins
2. Carotid arteries
3. Thyroid.
4. Trachea
5. lymph node

7. Neck:

1-The neck veins:

Comment on 2 points:

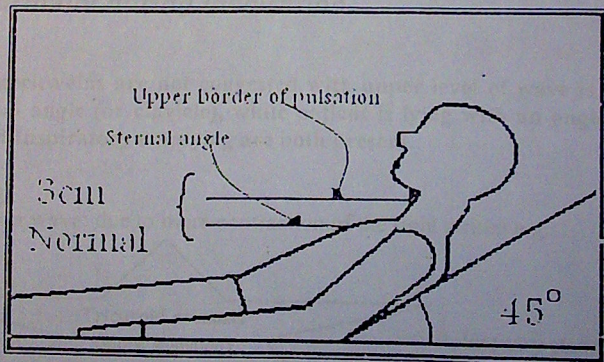
- (a) Congestion: congested or not. (b) Shape of the wave.

(a) Congestion:

- To examine the neck veins, the patient must be lying on bed in a semi-sitting position, with an angle of 45° to bed, as this position puts the neck veins at the same level as the right atrium and the clavicle at the same level of sternal angle.

Normally, the upper border of the wave is < 3 cm above the sternal angle. If the upper border of pulsation is elevated more than this, it indicates neck vein congestion.

If you have seen that the congestion is continuous above, & you can't see the upper border of wave, ask the patient to sit at an angle of 90° . Repeat the past steps taking a vertical distance between the 2 lines. If you still can't see the upper border of pulsation, ask the patient to stand up and do the past steps.



(b) Shape of the wave:

In diagram

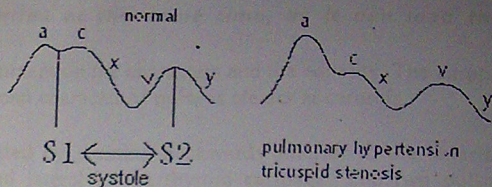
a- Atrial contraction

c- Notch (tricuspid closure)

x- Atrial relaxation

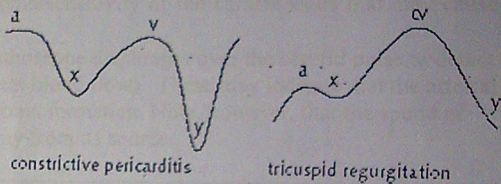
v- Atrial filling

y- Atrial emptying



N.B.

(1) Between S1 & S2 (ventricular systole), there is a systolic collapse i.e. neck veins have lowest pressure during Vent. Systole.



(2) Inspiratory emptying:

during inspiration, the -ve

pressure pulls the column of blood downward, so neck veins empty normally during inspiration.

Normally: neck veins are not congested with upper level of wave is seen about 3 cm above sternal angle (or clavicle), while patient is lying with an angle of 45°. Systolic collapse and Inspiratory emptying are both present.

abnormally:

(1) Giant a wave: due to more contraction of the right atrium e.g.

Tricuspid stenosis
(more common)

Pulmonary stenosis
Pulmonary hypertension

(2) Absent a wave: due to absence of normal atrial contraction e.g. Atrial Fibrillation.

(3) Systolic expansion: due to increased pressure in Rt. Atrium during vent systole e.g. Tricuspid Regurg.

(4) Loss of inspiratory emptying e.g. lung disease.

2-The carotids

(Never palpate both carotid arteries at the same time, as it can lead the patient to syncope):

- Use 3 fingers on one side only. Comment on the characters and the equality. The carotid is a mirror for the aortic valves. Special character of pulse is clearer at carotids.
- Carotid pulse

The carotid pulse should be palpated by pressing backwards anterior to the anterior border of the sternocleidomastoid and lateral to the thyroid cartilage. The two pulses should never be palpated at the same time or you will risk restricting the cerebral blood supply. Make sure that there is no hypersensitivity of the carotid sinus that may cause a reflex bradycardia.

- You should also listen with the stethoscope diaphragm over the carotid pulse to detect any bruits (noise caused by turbulent blood flow). These may indicate that the arterial lumen has been narrowed by atheroma formation. Note, however, that the sound of turbulent flow can be heard far away from its source.

N.B.

- ❖ *Turbulent blood flow in the heart is known as a murmur. Sound of turbulent blood flow anywhere else than the heart, as in the carotid artery, is known as a bruit.*
- ❖ *Murmurs are graded into 6 degrees. Grades 4, 5 and 6 are loud and felt, and are therefore known as having a palpable (thrill).*

3-The thyroid:

By inspection, you can see the thyroid gland moving up and down if the patient swallows. Comment on the size of the gland e.g. one or two big lobes.

- Palpation* of thyroid: from behind the patient by one or two hands.
- Percussion* by direct percussion by your finger on the upper third of the sternum to detect retrosternal thyroid.
- Auscultation*: You may hear a hum sound indicating blood entering and leaving the thyroid, pointing to the possibility of thyrotoxicosis, in which there is a high vascularity in the gland.

4-The trachea:

The examination is by 2 methods. The Pt. must be sitting and the head has to be fixed centralized by your Lt hand.

- In the first method, the index finger is pressed gently between lower part of sternomastoid & trachea on both sides in the suprasternal notch, to detect presence of tracheal shift.
- in the second method put the index finger on the Rt. Sternoclavicular joint and the ring finger on the Lt sternoclavicular joint and use the middle finger to detect any tracheal shift.

Causes of tracheal shift:

To the same side:

-Fibrosis.

-Collapse.

To the opposite side:

Any disease except COPD
(As retro sternal thyroid,
mass, pneumothorax,
Enlarged thymus.)

5-Lymph nodes:

If enlarged then

Comment on site, size, consistency, tenderness, moving or fixed

☺ if fixed confirm whether it's fixed to deep muscles & fascia or superficial skin

NB. • These comments on Lymph nodes must be commented on thyroid also.

• Cervical lymph nodes examined are:-

1) Circular group: Submental, submandibular, ant. & post. Auricular, occipital

2) Longitudinal group: Each divided into

- upper → anterior → superficial cervical
- Lower → posterior → deep cervical

Upper Limb:

② Inspect shape, size

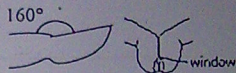
② in cretins: box shaped hand with 1 crease only واليد تكون مربعة وصغيرة

② in acromegaly: hand is spade shaped شكل الجاروف

② comment on any abnormality e.g. missing finger, (polydactyl) increased number of fingers, (syndactyl) adherent two fingers, nails as spooning nails in iron def. anemia, nodules.

Clubbing fingers:

Def: it's increased convexity of longitudinal & transverse axes of nail
(Normally the nails show window sign as the angle of nail bed is 160°)



Mechanism: 1) Malignancy 2) Toxemia for a long period 3) anoxia or central cyanosis for a long period

Grades: I) Disappearance of angle of nail bed



II) Diameter of periphery $\geq$ diameter of interphalangeal joints i.e.

Parrot Beak منقار البغیان



III) Drum sticks appearance.



IV) Continuation to wrist.

Causes of clubbing:

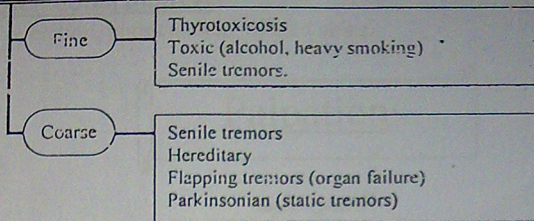
Pulmonary	① Bronchogenic carcinoma ② Suppurative: lung abscess or empyema or bronchiectasis. ③ Chronic lung failure: Interstitial lung fibrosis, Resp failure
Cardiac	① subacute bacterial endocarditis ② Congenital cyanotic heart disease
GI causes	① liver cirrhosis esp biliary cirrhosis ② Chronic suppurative: e.g. ulcerative colitis or Chron's disease ③ diverticulosis ④ polyposis & other inflammatory disorders
Miscellaneous	① familial ② Occupational or traumatic (in 1 or 2 fingers)

Tremors:

☺ Ask the patient to extend arm & elbow with fanning his fingers & hyperextension of wrist joint.



Types of tremors



N.B. Static tremors appear at rest & disappear in working.
Flapping tremors indicate organ failure mainly Lung & Liver.

8. Lower Limb: (as upper limb)

- 1) Clubbing toes
- 2) L.L.edema
- 3) Dorsalis pedis pulsation as in testing peripheral pulsation which is located 1st interosseous space or (better) Lateral to tendon of Hallucis Longus ms.

NB. Pistol shot: in aortic regurge the volume of pulsation is severely increased & detected in femoral artery = (peripheral manifestations of Aortic regurge)

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9-External genitalia:

Is part of abd examination.

- Examine for scrotal edema, vulval edema, testicular atrophy, undescended testis & scrotal ulcer.

10-Any other abnormality:

e.g.: scars of operation, pigmentation, dilated veins.

Palpation:

Types of palpation

1-superficial palpation

- ① to gain confidence of the pt
- ② to detect rigidity e.g.: peritonitis
- ③ to detect superficial mass e.g.: cyst, lipoma

D.D FROM DEEP mass

1. ask the Pt to contract his ant abd ms.
2. if deep mass → it disappears
3. if superficial → becomes more prominent

2-deep palpation

- ① To palpate intra-abdominal organs.

1) Liver:

☉ SURFACE ANATOMY OF LIVER:

Lt lobe is below costal the xyphisternum 2-3 fingers in the midline

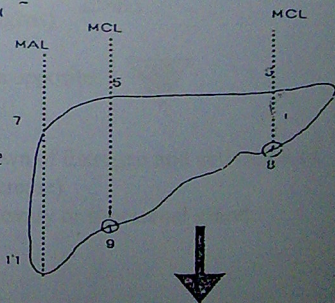
Rt lobe is below Rt. Costal margin by less than one

✓ **Normally:** not felt (due to being very soft)

x **Abnormally:** felt (if any pathology occurs in live

Grows directly downward

We should start palpation from Rt iliac fossa)



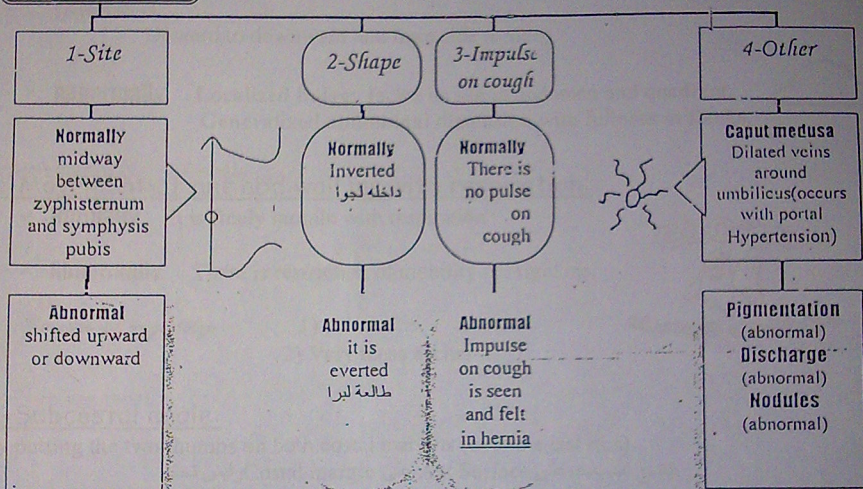
Growth

5-Divariation of recti muscle:

- تتطلب من المريض أن يهجم بجسمه من على السرير
- You see divariation of recti ms to form an anterior ridge due to weakness of ms from chronic increase in intra-abdominal pressure.

Cause of divariation: 1- Increased intra-abdominal pressure for long period.
2- Physiologically after many repeated pregnancies.

6-Umbilicus:



7-Pubic hair:

✓ **Normal** shape of hair distribution in male
Distribution of male pubic hair is under effect of androgens)

× **Abnormally** male has female distribution or the opposite.

Causes of feminine male pubic hair distribution.

Liver cell failure (as LIVER is responsible for breakdown of Estrogen and activation of androgen, so Estrogen increase and active androgen decrease)

* *Female has male distribution* indicates tumor in ovary or suprarenal gland.

8-Hernial orifices:

test for impulse on cough while patient is standing

✓ **Normally:** There is no impulse on cough over hernial orifices(femoral & inguinal)

ABDOMINAL EXAMINATION

INSPECTION

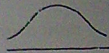
المشاهدة بالنظر

1- Shape:

- ✓ **Normally** abdomen is flat with concavity in flanks when the pt is lying on bed supine (flatness is:

Upward to downward and from side to side)

- × **Abnormally** Localized bulge: locate its site in abdomen and quadrant.
Generalized abdominal distension with fullness in flanks.



2- Movement of ant abd wall ms with respiration:

- ✓ **Normally** It is freely mobile with respiration
- × **Abnormally** There is restriction of mobility i.e. rigid ms.

Causes of rigidity:

- 1) peritonitis
- 2) Very tense ascites



3- Subcostal angle:

by putting the two thumbs on both costal margins (over the last ribs)

ضع اصبعيك على Ant Surface على Costal margin وليس تحته

- ✓ **Normally** It is acute زاوية حادة
- × **Abnormally** It is obtuse or wide زاوية منفرجة

Causes of Obtuse angle:

- 1) Organomegaly.
- 2) Ascites.
- 3) Intra-abdominal tumor or mass.

4- Epigastric pulsations:

epigastrium لابد أن تجعل عينك في مستوى

- Ask pt to stop breathing to see pulsation
- pulsation is seen and felt

Causes of pulsation:

- 1- Rt vent enlargement.
- 2- Liver pulsation.
- 3- Aortic pulsation (normal in very thin people).

WAYS OF PALPATION

1) One hand

- Press by finger tips or side of index (don't press when Pt inspiring)
- Ask Pt to take a breath & feel it.

2) Bimanual

- Put Lt hand at back behind lower ribs pushing up.
- Rt hand palpate on abdomen till Rt costal cartilage.

3) Hooking

- Put your fingers as a hook against Rt costal margin & try to feel the liver.
- Its done in shrunken liver mostly while Pt is sitting

4) Dipping

- Put your hand at Rt. Hypochondrium & push at site of liver & wait the reaction felt by hand. اضغط بطنه واستشعر الرد

5) Scratch

- Its done in tense ascites
- Put stethoscope in the midline & scratch by coin on abdomen from downward to upward (scratch from Rt iliac fossa)
- When sound change it indicates liver enlargement.

© LIVER DESCRIPTION

1- Site & 2- Size:

Liver is feltcm below Rt. costal margin in MCL & cm below subcostal angle in the idle line.

3- Consistency:

- Soft liver as in fatty liver, congestion, hepatitis.
- Firm liver as in cirrhosis, chronic hepatitis.
- Hard liver as in malignancy.

4-Border:

- Rounded in soft liver.
- Sharp in firm liver.
- Hard as in hard liver.

5-Surface:

- Smooth: in all liver diseases
- Irregular: in malignancy

6-tenderness (watch face of patient)

- Tender in :congestion, abscess, inflammation of capsule, infection(viral) & thrombosis.
- Not tender

7-pulsation:

by bimanual examination ايد ورا وايد قدام

- Pulsating liver: tricuspid regurge & stenosis, severe portal hypertension, aneurysm of hepatic artery, A-V anastomosis & transmitting pulsation from underlying arteries.
- No pulsation

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2) Gall Bladder:

☺ **PALPATION** by knowing 1st the surface anatomy

☺ **SURFACE ANATOMY OF GALL BLADDER:**

Line straight from Lt superior anterior iliac spine passing normal umbilicus position & end at Rt. postal margin.

✓ **Normally** not felt

× **Abnormally** felt large

With tenderness →

inflammation →

calcular

non calcular

Without tenderness → malignancy

3) Spleen:

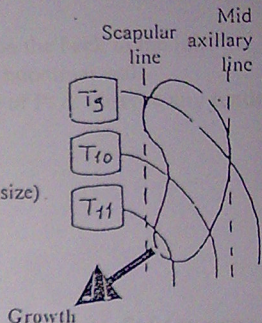
☺ **SURFACE ANATOMY OF SPLEEN:**

In Lt hypochondrium

✓ **Normally** : not felt

× **Abnormally** : felt (when it increase 3 times it's normal size)

Grows down & medially



☺ **WAYS OF PALPATION**

1) One hand

As in liver you start from a direction against growth from Rt iliac fossa & upwards & to Lt.

2) Bimanual

As in liver Lt hand at back & Rt hand on anterior abdominal wall. If not felt you should continue by this method but Pt turns to his Rt side (Rt lateral position)

3) Hooking

As in liver.

4) Dipping

As in liver.

5) Scratch

As in liver but scratch on Lt side.

☺ **SPLEEN DESCRIPTION:** 7 points as liver but substitute pulsation (no. 7) by splenic notch

4) Kidney:



☉

WAYS OF PALPATION

1) One hand

Palpating each loin by your right hand

2) Bimanual

- For the Rt kidney: as in liver. (Lt hand in loin & Rt. Hand on Ant. Abd. Wall)
- For the Lt kidney: you put the Rt hand on the back in the loin
Lt hand on Anterior Abdominal wall
So you can see the face of Pt & observe any tenderness

☉ SITE OF KIDNEY: called the loin

✓ Normally not felt

☉ KIDNEY DESCRIPTION: as in liver

☠ Differentiation between left kidney mass & splenomegaly:

	kidney enlargement	spleen enlargement
1-Insinuation	I can insinuate my hand below left costal margin i.e. I get the upper pole of mass	I cannot do this
2-Respiration	No effect	Pushed downward
3-Loin	Fullness in the loin	No
4-Light Percussion	right & left side is dull & middle is resonant due to presence of colon	Continuous dullness coming from under Lt. costal margin
5-Notch	Notch is absent	Notch is present & felt
6-Ballotement	posterior	anterior

☠ Causes of enlarged kidney:

	1-hydronephrosis	2-Polycystic kidney	3-malignancy
laterality	Unilateral or bilateral	Bilateral	unilateral
surface	smooth	irregular	irregular

5) Colon:

☺ PALPATION:

- Rolling against longitudinal axis of colon:
- Put one hand on the other hand & against longitudinal axis
- ✓ **Normally** not felt or felt but not tender.
- × **Abnormally** felt tender or mass due to
 - 1-irritation bowel syndrome
 - 2-infection
 - 3-ulcerative colitis
 - 4-severe colonic distention
 - 5-diverticulosis
 - 6-colonic mass

6) Aorta:

- ✓ **Normally** felt in thin people

7) Any abnormality:

e.g. Para aortic lymph nodes, ovarian mass & any masses apart from the above organs.

PERCUSSION

Rules of percussion:

1. Start from area which is resonant to detect area which is dull.
2. Percussed finger is put parallel to the border of organ or ascites.
3. Light percussion for superficial masses & heavy percussion for the deep masses.

1) *Upper border of liver* is to be percussed 1st

☞ It's called tidal percussion & it is heavy percussion.

👉 at first you have to identify 2nd rib by sternal angle (second space is below second rib)

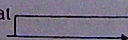
👉 Then percuss all spaces downwards starting from second space of chest.

👉 Then when you reach space which is dull ask pt to take a breath & keep it inside.

👉 you will observe by percussion that the dull space becomes resonant
This is the upper border of liver.

2) *Traub's area*: it's area above stomach (air bubble) It has tympanetic note on percussion

☺ *SURFACE ANATOMY*: 4 points

- * Laterally at MAL 9th, 11th ribs of Lt Side
- * Medially at  5th Lt Intercostals space in MCL
8th Lt costo-chondr. junction.

👉 Start the percussion from the centre of the area which is resonant.

👉 Then percuss upward, downward, medially & laterally.

☺ CAUSES OF DULLNESS in Traub's Area:

1. liver enlargement (from Rt. side)
2. splenomegaly (from Lt. side)
3. Lung & plural diseases. (from above)
4. Colon mass & ascites. (from below)
5. Mass in the stomach. (from below)

2) Percussion for ascites:

- ☺ Use rules of percussion to know upper & side borders of ascites.
- ☺ Start from midline below sub-costal angle till you detect dullness then move little up & then turn your hand axis 90 degrees to detect the side border (dullness).

☺ WAYS OF PERCUSSION FOR ASCITES:

1. Transmitting thrill: → (In tense fluid)

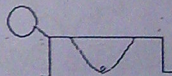
- ♫ Ask Pt to put his medial edge of palm & little finger on midline &
- ♫ Elicit a thrill by your fingers from one side
- ♫ Feel its transmission to other side by palm of your other hand
- ♫ Put Pt hand on midline to abolish transmission of thrill through Ant. Abd. wall.

2. Shifting dullness: → (moderate fluid) نبدأ به

- ♫ Percuss as above steps & if you notice dullness in side continue till the flanks.
- ♫ Then turn the Pt to his opposite side
- ♫ Wait for 1/2 minute then percuss.
- ♫ You will observe resonance after being dull, this indicates shifting of fluid.

3. Knee-Elbow position: → (minimal fluid)

- * Pt is lying on his knee & elbow only
- * You percuss at the umbilicus position for dullness



AUSCULTATION

الاستماع

☺ By stethoscope we hear these sounds:

1. Intestinal sound normally heard 6-8/ minute
2. Hum: sound of increase vascularity as in portal hypertension.
3. Rub: on liver & spleen due to peri-capsulitis.
4. Bruit: on renal arteries (back or front) indicate renal stenosis (which cause hypertension in young adults).

☒ Causes of hepatomegaly:

1. Infections: hepatitis, bilharziasis, abscess, fascioliasis & hydatid disease.
2. Inflammation: connective tissue disease & rheumatic disease.
3. Infiltration: fatty liver, glycogen storage disease & amyloidosis.
4. congested liver
5. Malignancy: 1ry & secondaries
6. Leukemia & Lymphoma.

☒ Causes of splenomegaly:

1. Infections: bilharziasis, infective endocarditis, Kala Azar, amoebic abscess, malaria.
2. Inflammation: as in liver
3. Infiltration: as in liver
4. Malignancy
5. Blood diseases: hemolytic anemia, sickle cell anemia (but in early stage before thrombosis)
6. Myeloid Leukemia, hairy cell leukemia.

☒ Causes of ascites:

Local

- i. Malignancy
- ii. T.B peritonitis.
- iii. Lymphatic obstruction.

General

- i. Nutritional
- ii. Cardiac
- iii. Renal
- iv. Hepatic: due to
 - a) Hypoproteinemia
 - b) Portal hypertension
 - c) Increase Aldosterone.
 - d) Increase Na & water retention
 - e) Increase incidence of bacterial peritonitis.
 - f) Lymphorrhea due to increase size of spleen & liver.

GHOSTs



aLwAys aRoUNd u

☒ Clinical Manifestations of Portal Hypertension :-

- 1) Porto-Systemic shunts e.g. Varices which is the surest sign.
- 2) Splenomegaly.
- 3) Ascites.

CHEST EXAMINATION

INSPECTION

1) Shape:

- You should stand at head or feet of the patient as in case of abdomen.

✓ **Normally** Ratio of A-P diameter & side to side diameter is 5:7

✗ **Abnormally:**

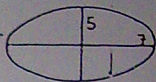
a) Localized:

Bulge or retraction

To be sure ask the patient to breathe deeply several times & observe the side which moves less is the abnormal one (retracted or bulged) & other side moves well.

b) Generalized:

Increased the A-P diameter to be equal to side to side diameter or exceeds it i.e. Ratio 7:7 or 8:7. Chest shape is called then "Barrel shaped" شكل البرميل. It occurs in case of COPD.



2) Movement of chest wall with Resp. (chest expansion):-

✓ **Normally** two sides moves well & equal.

✗ **Abnormally:** one side moves well & other moves less (bulge or retraction) Or the two sides move equally but less than normal i.e. bilateral restriction of mobility eg in COLD.

3) Respiration:-

Examine

Rate of resp in one min & its Rhythm

Type of resp in male & female

Accessory muscle of respiration

Accessory ms of Resp include sternomastoids, trapezius, latissimus dorsi, ala nasi pectoralis ms...etc. Normally, these ms do not work, but in lung disease they start to work. Thus working accessory ms of resp indicates resp obstruction.

N.B.

⊗ Normally in male respiration is abdominothoracic & in female it is thoracoabdominal.

⊗ Litten's sign: Normally when any one breathes, the lower intercostals muscle go inwards & appear when patient lying on bed.

⊗ Exaggerated Litten's sign occurs when there is increased reseeded inwards of lower intercostals ms with inspiration. It indicates lung pathology.

5 Sites

4) Pulsations:-

A) Apex:

✓ Normally apical pulsations are seen & felt

✗ Abnormally not seen in case of COPD (Emphysema) i.e. absent apical pulsation.

B) Epigastric pulsations:

Causes: Aortic, Rt ventricle, or hepatic.

Thus in COPD epigastric pulsations may be due to Rt ventricle + + + i.e. Cor Pulmonale, or may be hepatic in origin.

- Cor pulmonale:

is right ventricular enlargement secondary to COPD with or without right ventricular failure".

- Pathology of COPD:

* During expiration, which is a passive process, some air is retained in air sacs (as bronchioles are constricted) & this lead over long time to:

* The lung become hyperinflated

* The walls of air sacs disrupted *تقطع*

* Decrease in gas exchange

* Resp. failure & central cyanosis.

C) Left Parasternal pulsation:

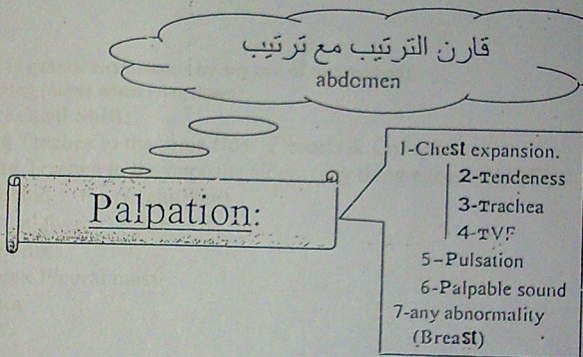
Seen in 3rd, 4th, 5th left intercostal spaces these pulsations indicate Rt. ventricular enlargement eg in Cor Pulmonale secondary to COLD.

D) 2nd left space: present in pulmonary hypertension.

E) 2nd right space

5) Any abnormality:

- Specially the BREAST examination (very Important)
The patient may complain of hemoptysis due to pulmonary metastasis secondary to Breast cancer.
- Other abnormalities.
- Scars of operations.
- In males examine for detection of gynecomastia which is small rounded glandular breast tissue & it is tender.
- Dilated veins.



1-Chest expansion:

- Place your hand over the chest in three sites:

Mammary

Supra-mammary

Infra-mammary

- Place your both hands over these sites & observe movement of the chest with respiration
- In supra- mammary your hands are parallel.
- In mammary & infra-mammary you should take skin fold between 2 thumbs & observe movement of the tips of the two thumbs from the middle line.
- Normally both sides move Well and Equally.

2- Tenderness:

- Use your fingers to press all parts of the chest & observe patient's face for any agony.
- At lower parts separate your fingers and press by tips in the lower intercostal spaces bilaterally.

Cause of tenderness: من برا الجوا

- a) Skin: Herpes.
- b) Bones: Fracture rib.
- c) Muscles: Intercostal myositis.
- d) Pleura: Pleurisy.
- e) Lung: Abscess or infarction & inflammation.
- f) Tension pneumothorax.

3- Trachea:

- As explained in general examination by any one of two methods.
- Pt must be sitting (never when lying down).

* Causes of Tracheal Shift:

- Causes Pulling Trachea to the same side: Fibrosis & Collapse.

- Causes Pushing Trachea to the opposite side: (any thing except COLD)

Thymus gland +++ (in children)

Retro-sternal thyroid +++

Pneumothorax

Hydrothorax Pleural mass

Lung tumor

4- TVF: or tactile vocal fremitus: صدى الصوت المحسوس

- Use one hand only to compare between the two sides.
- You have to know the normal to be able to detect abnormal increase or decrease.

تضع يدك على الصدر و تسأل المريض أن يقول 4.4 مرتين متتاليتين و تستمر على جميع أجزاء الصدر و تقارن إذا ما كان علوي أم متغير.

⊖ Causes of ↑:

- Cavitation
- Consolidation
- Collapse but must be with patent bronchus (obstructive collapse).

⊕ Causes of ↓:

Any other chest (lung) disease. (Pleural effusion, mass, COPD, consolidation)

5- Pulsation:

- Palpate for 5 site discussed before. (page 24)

6- Palpable sounds:

- place your hand over the chest and feel any of these two sounds while the patient breathes:
 - * Wheezes تزيق
 - * Crepitations طقطقة او بقله

N.B. Wheezes are called Rhonchi when auscultated.

7- Any abnormality:

(esp. breast)

GHOSTs



اسرد السبعة نقاط بالترتيب لكي
لا تنسى

aLwAyS aRoUnD u

PERCUSSION

1) Percussion of upper border of liver Tidal Percussion:

- Heavy percussion (refer page 21)
- There is encroachment of dullness of upper border of liver in COPD.

2) Cardiac Percussion (cardiac dullness)

Percuss for bare area of the heart

- Light percussion

- ✓ **Normally** it is dull by light percussion "Bare area" (detected in 4th & 5th left intercostals space & parasternally)

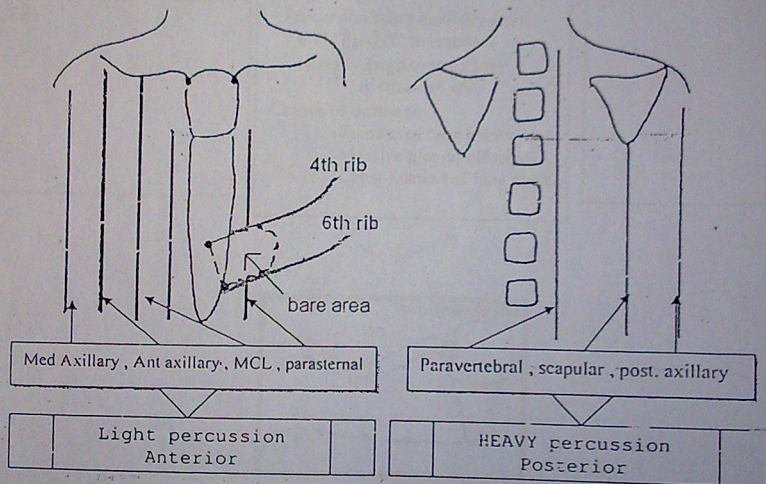
- × **Abnormally:** resonant

Causes of Resonance of bare area:

- a) Emphysema in COPD.
- b) Pneumothorax.
- c) Dextrocardia.

3) Percussion of lung:

- Percuss all spaces (space by space) in all lines



- ✓ **Normally** Resonant (Except in: 1-upper border of liver. 2- bare area of heart)
- × **Abnormally** Dull anywhere else OR resonant in 1 & 2

4) Percussion of special areas:

Clavicle

By index "direct percussion" on middle 1/3 of clavicle

✓ **Normally:** resonant (apex of lung)

✗ **Abnormally:** Dull.

Causes of dullness:-

- Tumor of lung apex.
- Massive pleural effusion.
- Consolidation of lung apex (TB)

Kronig's isthmus

(Arca above the clavicle)

Surface Anatomy:

Medial: from sternoclavicular joint to spinal process of C7
أكبر اتساع في الظهر بعد ما يوطي

Lateral: from junction of medial 1/3 & lateral 1/3 of clavicle to spinous process of the scapula (highest point)

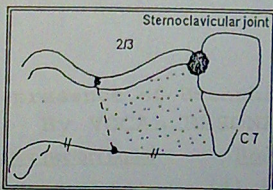
- Percussion starts medially from dull "لأول مرة" to resonant laterally. (against rules)
لأنه الحثه ضيقه جدا

Causes of dullness:

- Tumour of lung apex
- Massive pleural effusion.
- Consolidation of lung apex

Traub's area

(Discussed in abdomen) (page 21)



Superior view

AUSCULTATION

Rule of Auscultation:

- Auscultate all spaces in all lines front & back.
- Patient must breathe from his mouth.

- I) Breath sound
- II) Additional sound

I - Breath Sounds:

✓ Normal breath sounds:

You must hear all inspiration & 1st 1/3 of expiration with no gap in between.

✗ Abnormally:

→ 1) Harsh vesicular (vesicular breathing with prolonged Expiration)

You hear all inspiration & prolonged expiration, it occurs in COPD "معظم حالات الامتحان"

→ 2) Bronchial breathing:

• You hear all inspiration & prolonged expiration with a gap in between & with hollow character. "كأنه صوت هواء في مملوءة"

Bronchial breathing normally heard over trachea & main bronchi.

ghosts

aLwAys aRoUnD u

❖ Tests to assure presence of Bronchial Breathing:

By VOCAL RESONANCE

	Whisper pectori liquor	Bronchophony	Aegophony
method:	Ask the patient to say 4-4 by very low sound. "اطلب من المريض أن يقولها بـ همس"	"اطلب من المريض أن يقولها بصوت عادي"	"اطلب من المريض أن يقولها بـ همس"
bronchial	Clear, distinct sound is heard	heard on chest louder than mouth	Nasal tone صوت زي الماعز
vesicular	Low, faint sound	not	not

II- Additional sounds:-

Rhonchi "wheeze on palpation"

Crepitations

Rub

1) Rhonchi: "تريق"

- Due to narrowing by bronchoconstriction OR increased secretions.
- Wheezes disappear after the patient coughs in case of increased secretions.
- It occurs 1st at expiration then inspiration & expiration.
- It is 3 types: حسب حدة الصوت (pitch)
 - A) Sibilant: رفيع حاد high pitch & heard more in periphery of chest. (أكثر مكان ضيق)
 - b) Sonorous: غليظ low pitch & heard more at center of the chest
 - c) Polyphonic: combined.

2) Crepitations: "طقطقة"

- Must be during inspiration (due to opening of air sacs or bubbling into secretions)
" هواء يدخل إلى الماء فيحدث طقطقة لفتح أكياس الهواء "
- It is 3 types:

بحسب علو الصوت (intensity)

a) Fine أقل

b) Medium متوسط

c) Coarse عالي

3) Rub: "Harsh gritty sound"

- It occurs in case of pleurisy & disappears when patient stop the breathing.
- Usually associated with local tenderness.

CARDIAC EXAMINATION

INSPECTION & PALPATION

I- Shape:

- ✓ **Normally:** both sides are symmetrical without any bulge.
- ✗ **Abnormally:** precordial bulge indicates cardiac disease when the patient was a child & lasts for life due to ossification of ribs.

II- Pulsations:

- 1) Apex
- 2) Epigastric pulsation
- 3) Lt. Parasternal pulsation
- 4) 2nd left space
- 5) 2nd right space



1) Apex

- It is lowest & outermost pulsating part or point, & it is formed by left ventricle only.
- *Causes of absent apical pulsations:*
 - i. COPD.
 - ii. Apex behind a rib.
 - iii. Pericardial effusion.
 - iv. Pleural effusion.
 - v. Myxoedema.
 - vi. Very obese patient.
 - vii. Dextrocardia.

✓ **Normally:** apex is seen & felt.

"إذا لم تر أو تحس مكان apex والمريض دائم اجعله ينام على الـ left side وحس مكان الـ Apex"

• Comments on apex:

- 1) Site
- 2) character
- 3) force
- 4) localization
- 5) Palpable sound.
- 6) Palpable thrill

1) Site:

- ✓ **Normally:** 5th left intercostal space in MCL.
- x **Abnormally:**
 - ⊗ Shifted outwards (laterally) in right ventricular enlargement.
 - ⊗ Shifted downwards & outwards in left ventricular enlargement.

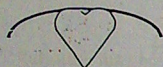
2) Character:

- ✓ **Normally** systolic bulge. "المنقبض لبره".
- x **Abnormally:**
 - ⊗ More systolic bulge in left ventricular enlargement
 - ⊗ Systolic retraction in right ventricular enlargement.

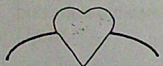
2) قوة الضربة Force:

- ❖ In right ventricular enlargement  weak apex.
- ❖ In left ventricular enlargement  **FORCIBLE APEX.**

👉 if forcible detect that if it is:



Sustained ... يَنْتَظِرُ شُرَّة
As in Aortic stenosis and hypertension



Hyperkinetic... يبرز على الجلد
As in Aortic regurg, high output states (thyrotoxicosis), MI.

✌ Determine also the type of Rocking:

i. Internal rocking:

i.e. in left ventricular enlargement the systolic bulging of the apex is directed internally i.e. to the middle line.

ii. External rocking:

i.e. in right ventricular enlargement it is directed externally i.e. away from the middle line.

4) Localization:

- x **Abnormally:** in right ventricular enlargement : the apex is diffuse
i.e. occupy more than one space
But in left ventricular enlargement the apex is localized
i.e. occupies one space

5) Palpable sound:

x Abnormally:

- S1 is felt in mitral stenosis.
- S3 is felt in mitral regurge.
- S4 is felt in severe hypertension.

6) Palpable thrill: إحصاس بالاهتزاز

A thrill is a palpable murmur of grade 4-5-6.

i. Systolic thrill is felt on apex in MR, AS

ii. Diastolic thrill is felt on apex in MS

Every thrill is accompanied by murmur but NOT every murmur is accompanied by thrill.

2) Epigastric pulsation

Seen then palpated by putting the hand in the epigastric quadrant with the tip of the middle finger in the intercostals angle and press slightly to feel the direction from which the pulsations come:

- *Hepatic pulsations come from the right side of the patient.
- *Right ventricular pulsations come from upwards or from the left of the patient.
- *Aortic pulsations come from down against the palm

3) Left Parasternal pulsation

Pulsation may be seen and felt in the 3rd, 4th, and 5th left intercostals spaces just to the left of the sternum. They are felt either by the tips of the separated fingers or by the base of the palm. As before pulsation indicate Rt. Ventricular enlargement. if pulsations are strong, this is called Lt Parasternal Uplift.

4) 2nd left space

Pulsations in the 2nd left space are due to

- Pulmonary hypertension.
- Pulmonary dilatation
- Aneurysm of aorta.

Comment if pulsations are:

*Seen

*Felt

*Any palpable sounds (S2, pulmonary)

*Any palpable thrill.

Diastolic Shock:

Palpable S2 in Pulmonary area i.e. ↑ S2 (it is due to pulmonary hypertension)

5) 2nd right space

(1st aortic area)

Pulsations in the 2nd right space are due to systemic hypertension.

Comment if pulsations are:

- *Seen
- *Felt
- *Any palpable sounds (S2, aortic)
- *Any palpable thrill (Systolic in AS, and diastolic in AR).

III- Any abnormality:

Any other abnormal findings, scars of operations...

ghOsTs

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PERCUSSION

I- Upper border of liver:

Tidal percussion as before. Normally it lies in the 5th right intercostal space in the MCL. (Heavy percussion)

II- Cardiac percussion: ALL CARDIAC PERCUSSION IS DONE BY HEAVY PERCUSSION EXCEPT BARE AREA OF THE HEART.

1) Right border of the heart:

Percuss for right border in 4th right space starting from the MCL medially to sternal border.

- ✓ **Normally:** it is resonant
- * **Abnormally:** dull & indicate
 - * Right atrial enlargement
 - * Ascending aortic aneurysm.
 - * Aneurysm of left atrium.
 - * Pericardial effusion
 - * Pleural effusion and other pulmonary causes.

2) **Waist of the heart:**

Percuss for it in left 3rd space starting from the MCL medially to sternal border

✓**Normally:** resonant except one finger beside the sternum

✗**Abnormally:** dull & indicate

*Left atrial enlargement

*Pericardial effusion

*Pleural effusion and other pulmonary causes.

3) **Bare area of the heart: (as in chest examination)**

If area of dullness is increased i.e. extends outside the MCL, this indicates any chamber enlargement. (Light percussion).

4) **2nd left space:**

✓**Normally:** it is resonant

✗**Abnormally:** if dull more than one fingers it indicates:

i. Pulmonary hypertension.

ii. Pulmonary dilatation.

iii. Aortic aneurysm.

iv. Pericardial effusion.

v. Pleural effusion.

vi. Mass in lung or pleura.

5) **2nd right space:**

✓**Normally:** it is resonant

✗**Abnormally:** dull due to:

i. Systemic hypertension.

ii. Aortic dilatation.

iii. Aortic Aneurysm.

iv. Pericardial effusion.

v. Pleural effusion.

vi. Mass in lung or pleura.

6) **Outside the apex" periapical ":**

✓**Normally:** it is resonant

✗**Abnormally:** dull & indicate pericardial effusion.

7) **Lower 1/3 of the sternum:**

By your finger "direct percussion "

✓**Normally:** it is resonant.

✗**Abnormally:** dull & indicate right ventricular enlargement ...

..This is the only way to detect specifically right ventricular enlargement by percussion..

AUSCULTATION

♦ (5 sites):

- I- Apex & left axilla.
- II- Right 2nd space.
- III- Left 2nd space.
- IV- Lower sternum.
- V- 3rd, 4th, 5th left spaces for Ventricular Septal Defect "VSD".

*First sound is best heard at mitral & tricuspid areas.

*Second sound is best heard at pulmonary & aortic areas.

I- Apex:

After identifying the place or location of the apex put the stethoscope, you will hear heart sounds:

✓ **normally:** "Lup - Dup) ...S1, S2

✗ **Abnormally:** you hear murmur due to turbulent blood flow.

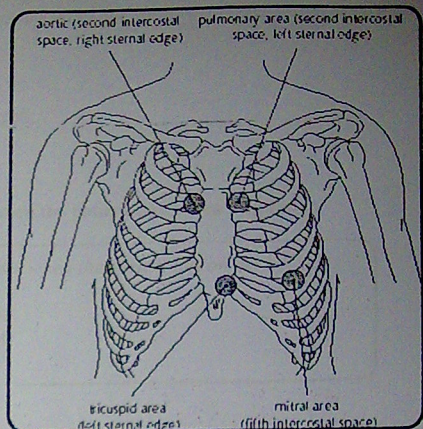
Mitral murmurs are concentric localizes murmurs. They are murmurs that we must search for. Their intensity increases by putting the patient in the left lateral position.

o there are two types of apical murmurs:

- 1) Systolic as in case of MR, AS
- 2) Diastolic as in case of MS, AR

MS gives a diastolic rumbling murmur with presystolic accentuation and accentuated 1st heart sound (S1).

MR gives a pansystolic murmur propagated to the axilla.



© **Axilla:** Abnormally heard murmur.

• Any murmur heard on axilla it will be systolic murmur, so it is MR.

II- 2nd right space:

Aortic murmurs are heard louder on aortic area, they may be propagated to apex, they are propagated to carotids (esp AS), and they increase in intensity if the patient sits and leans forwards.

✓ **Normally:** you hear sound of closure of aortic valve.

✗ **Abnormally:** you hear murmur, systolic in AS and diastolic in AR.

III- 2nd left space:

✓ **Normally:** hear closure of pulmonary valve (S2)

✗ **Abnormally:** increase S2 in pulmonary hypertension.

Murmurs are rarely heard. If present they indicate either PS or PR.

IV- Lower sternum:

✓ **Normally:** hear closure of tricuspid.

✗ **Abnormally:** You hear murmur... it is two types:

- 1) Systolic which occurs in TR
- 2) Diastolic which occurs in TS

Tricuspid murmurs increase in intensity when the patient takes deep inspiration.

- In MS, S1 is accentuated & murmur is louder when the patient lies on his left side.
- In AR it is:
 - Best heard over 2nd aortic area.
 - By leaning forwards, it is loud.
 - Propagates to carotids.



HOW to differentiate between the carotids & neck veins

سؤال مهم

Carotid

Anterior to anterior border of sternomastoid muscle

Felt more than seen

One wave pulsation (artery)

Does not change with respiration

When palpated you feel pulsation

Neck Veins

Posterior to anterior border of sternomastoid muscle

Seen more than felt

Two waves are seen

Empty during inspiration (inspiratory emptying) and show systolic collapse

When palpated the wave disappears

Causes of accentuated S1 :

- Mitral Stenosis
- Short P-R interval.
- High Cardiac output states. (Thyrotoxicosis, severe anaemia)

Causes of soft S1 :

- Calcified or hard mitral valve cusps in MS.
- Prolonged P-R interval as in first degree heart block.

S2 is due to closure of both pulmonary and aortic valves and heard as a single sound during expiration.

During inspiration, it is split into its 2 components (pulmonary component is delayed) due to delay in Rt ventricular contraction due to increased systemic venous return. Splitting is only heard on pulmonary area.

Causes of Wide splitting of S2 :

S2 is widely split during inspiration.

- Pulmonary Stenosis (prolonged Rt Ventricular systole)
- RBBB

Causes of Reversed Splitting of S2 :

S2 is single during inspiration and split during expiration. (Aortic valve closes after Pulmonary)

- AS and MI (prolonged Lt Ventricular systole)
- LBBB

